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Towards a More Sustainable Pulp and Paper Industry with Deep Eutectic Solvents

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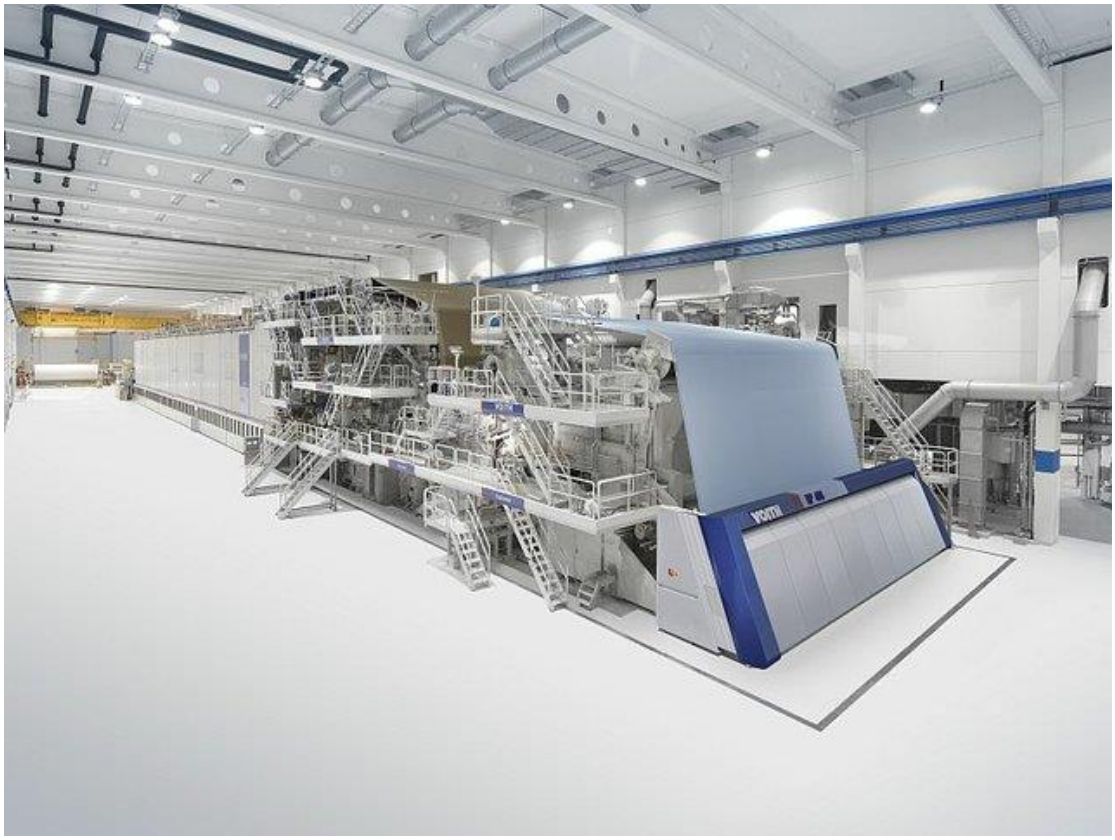

At a special conference organized as part of the Paper and Beyond 2018 event in Brussels, the first phase of the PROVIDES project was officially completed.

Voith was an active participant in the project, thus supporting the pulp and paper industry's technological transition towards meeting its climate objectives.

PROVIDES, which stands for "Processes for Value added fibers by Innovative Deep Eutectic Solvents", is a research and innovation project within the Biobased Industries Initiative, with the goal of significantly reducing CO2 emissions in pulp and papermaking.The completion of the first phase was celebrated with the publication of a booklet describing the potential of Deep Eutectic Solvents (DES) for creating breakthrough innovations in the pulp and paper industry.

Revolutionizing the industryIn November 2011, the Confederation of European Paper Industries (CEPI) launched its vision for the sector in the next 35 years, concluding that breakthrough technologies would be needed to make the industry more sustainable. Specifically, it aims to achieve an 80% reduction of CO2 emissions and at the same time create 50% more value. The PROVIDES consortium shows that a revolutionary change is now possible. New, mild pulping technologies based on natural Deep Eutectic Solvents lead to a significantly more sustainable process that is energy-, cost- and resource-effective, while producing much lower CO2 emissions.

The total DES conceptDeep Eutectic Solvents are nature-based, renewable, biodegradable, low-volatile and cost-effective. The overall objective of the DES concept is to achieve a 40% reduction of energy use and an 80% reduction of CO2 emissions in pulp and papermaking. The DES concept will enable the industry to obtain a radically new, sustainable and techno-economically feasible pulping technology, while also enabling the selective recovery of dissolved components. In addition, DES can be regenerated and recycled, ensuring economical use of resources. This technological innovation produces high-quality cellulose fibers for papermaking, while simultaneously producing high-quality lignin and hemicellulose fractions for a variety of high-volume applications.

Results and achievementsIn the first phase of the PROVIDES project, more than one hundred new DES were developed. Of these, two have been further developed as successful delignifying agents. The project proved that the entire DES pulping process can be run at operational costs similar to those of kraft pulping, and that the resulting cellulose fibers have good tensile strength and extreme internal bond strength. In addition, it was proven that DES delignification results in 95% lignin removal, and that the lignin can be successfully recovered and the DES regenerated.

Next stepsIn the coming years, the pulping part of the DES research cluster, coordinated by the Institute for Sustainable Process Technology (ISPT), will continue to conduct further applied research towards the realization of a DES pulping pilot and demo, ultimately leading to commercial implementation in 2030.